Pedestrian Fatalities of Native Americans in the States of Michigan, Minnesota, and Wisconsin. Byron P. Bailey, Class of 1987.

Pedestrian fatalities are the second largest category of motor vehicle deaths. In 1981, about one in every six traffic related deaths were pedestrian related.(1) In a study of Washington residents, pedestrian-vehicle incidents (PVI's) were less frequent but much more lethal than non-pedestrian, motor vehicle collisions. The percentage of fatal PVI's was 6% compared to 0.6% for non-pedestrian collisions. Virtually all PVI's involved an injury, compared to less than 40% of the other collisions.(2) While efforts are made to promote child passenger restraint use, fatal pedestrian injuries occur more often than fatal passenger injuries among 5 to 9 year olds.(1)

American Indians and Alaska Natives (AI/AN) have the highest pedestrian death rates in the US. The U.S. all races pedestrian death rate for 1980 was less than 5/100,000.(1) The overall AI/AN pedestrian fatality rate for the years 1981-1983 was 14.8/100,000.(3) The purpose of this study is twofold:

1. To characterize Native American pedestrian fatalities (NAPF's) in Michigan, Minnesota, and Wisconsin; and
2. To identify and investigate clustered pedestrian fatality sites to develop potential injury intervention strategies.

METHODS

All pedestrian fatalities occurring to Native Americans in Minnesota and Wisconsin during the years 1979 through 1986, as well as all pedestrian fatalities occurring to Native Americans in Michigan during the years 1979 through 1985, are represented in this study. In addition, one NAPF that occurred in Minnesota in 1987 is included in the study. Initial data were derived from death certificates obtained from the health statistics departments in Michigan, Minnesota and Wisconsin. All deaths coded with International Classification of Diseases ICD-E codes 814.7 and 822.7 (pedestrian-vehicle deaths) were retrieved. Additional data, for the clustered fatality sites investigated, were obtained from police reports from the Red Lake Reservation (Minnesota) Tribal Police, the Minnesota Department of Public Safety, and the Menominee Reservation (Wisconsin) Tribal Police.

The characterization for all of the pedestrian fatalities represented in this study was completed with the assistance of the LOTUS 1-2-3 computer spreadsheet program.[4] Investigation of clustered site fatalities were conducted at the exact location of each fatality site. Information on the City of Minneapolis Accident Reduction Project (TACT - Top Accident Control Targets) was obtained from the City of Minneapolis Department of Public Works. There are, admittedly, several limitations to this study's findings. Limitations to the general characterization includes the reliance on death certificate data without verification and the fact that these data are from one geographical area of the United States, only. The possibility that there may have been some environmental changes, since a particular pedestrian fatality occurred, is a limitation to the findings resulting from the investigation of the clustered site pedestrian fatalities.

RESULTS

A. Characterization: A total of 92 NAPF's are represented in this study. 14 occurred in Michigan, 46 in Minnesota, and 32 in Wisconsin. The greatest number of NAPF's were among 20-29 year olds (26%). Males were over-represented by a ratio of 2.5 to 1.0.

Pedestrian Action

Pedestrian action could be determined, through either review of death certificate data or direct fatality investigation for only 49 of the 92 NAPF's. Of these 49, the greatest number of identified actions were as follows:

Walking along roadway (2 lanes)	9
Lying in roadway (2 lanes)	6
Crossing roadway, not in crosswalk (4 lanes, not divided)	4
Hit by backing motor vehicle in driveway	4
Crossing in crosswalk at intersection (4 lanes, not divided)	3
Crossing on divided highway (2 lanes)	3
Hit and run (no further information)	3
Crossing in roadway (2 lanes)	2
Crossing in crosswalk at intersection (2 lanes)	2
Fighting in roadway (2 lanes)	2
Standing on divided highway (2 lanes)	2

Season, Day, and Time: The number of NAPF's per month peaked in May and declined to their lowest levels during the winter months. 71% of these fatalities occurred 8 PM-6 AM. Saturdays and Sundays were the peak days for NAPF's. 17 of 31 (55%) fatalities that occurred on Fridays and Saturdays were between 5 PM Friday and 5 AM Saturday. 24 of 45 (53%) fatalities on weekends occurred between the 5 PM Saturday and 5 AM Sunday. In total,

45% of all NAPF's occurred within the two aforementioned twelve hour time periods. Over 40% of all NAPF's occurring on Thursdays involved victims less than 10 years old.

Rural vs. Urban: In the 2 relatively rural counties (Beltrami, MN and Menominee, WI) vs. the urban county of Hennepin, MN, a greater percentage of older, female, and daytime NAPF's occurred in the urban county.

B. Clustered NAPF's: Three geographical areas had clusters of NAPF's.

Red Lake Reservation, MN

1. (September) A 23 y.o. man was struck by a vehicle on the roadway at 11:45 PM. He was struck at the intersection of SR 1 and Barton Camp Trail. He was found lying in the westbound lane of SR 1.
2. (June) A 27 y.o. man was struck by a vehicle while lying in the road at 10:10 PM. He was struck on IS 50, 1/10 mile from SR 1. The police report said the driver was passing another vehicle when he struck the victim.
3. (May) A 16 y.o. boy was struck by a vehicle, while lying in the road, at 3:58 AM. He was stuck on S. R. 89/1 approximately 1.3 miles west of the SR 89 S junction.
4. (July) A 23 y.o. man was struck by a vehicle while walking eastbound on the south side of the highway, at 2:10 AM. He was stuck on SR 89/1 3 miles west of the SR 89 S junction.
5. (December) A 25 y.o. man was struck at 6 AM while walking eastbound on SR 89/1 3 1/2 miles west of the SR 89 S junction. The vehicle, also traveling eastbound, had just completed a pass of another vehicle.

Menominee Reservation, WI

6. (June) A 32 and a 33 y.o. man were killed simultaneously while fighting on the highway, at 2:29 AM. They were struck on Route 47, 8/10 mile north of the Routes 47/55 junction, by a car traveling southbound on a foggy night.
7. (February) A 21 y.o. man was struck while walking on the east side of the highway headed southbound from a tavern, at 1:15 AM. He was stuck on Route 47 approximately 8 miles south of the Routes 47/55 junction. There were two taverns located 3/10 and 4/10 of a mile north of the fatality location, respectively. A sidewalk, located on the east side of the highway, began approximately 100 feet south of this fatality site.
8. (October) A 62 y.o. man was struck by a vehicle with the same specifics as described in case 8.

Minneapolis, MN

Franklin Avenue

9. (February) An 8 y.o. girl was stuck while crossing in the crosswalk at the intersections of E. Franklin and Park Avenues, at 3:00 PM. She was walking north, with a "WALK" signal, on the east side of the intersection when a vehicle made a right turn from Park Avenue onto Franklin Avenue. There was a glassed-in bus stop about 35 feet south of this intersection, on the east side, that may have obstructed the driver's view of the crosswalk.
10. (August) A 24 y.o. man was struck at 2:15 AM while lying in a crosswalk on the east side of the intersection of Frankin and Chicago Avenues. A large package liquor store was located at this intersection. Its current hours of operation are from 8 AM to 10 PM on Fridays and 8 AM to 8 PM on Sundays through Thursdays. This fatality occurred on an early Saturday morning.
11. (May) A 24 y.o. man was struck while crossing the roadway, at 1:17 AM at E. Franklin Avenue, from south to north, at a point 30 feet east of 14th Avenue. The victim was not crossing in a crosswalk. This fatality occurred in the vicinity of the Minneapolis Native American Center. A crosswalk was located further east on Franklin Avenue at a stoplight.
12. (April) A 50 y.o. man was struck at 7:45 PM while crossing E. Franklin Avenue, from north to south, at a point 120 feet west of 16th Avenue. The victim was not crossing in a crosswalk. This fatality occurred directly in front of the Minneapolis Native American Center.

Double Fatality

13. (October) A 54 y.o. man and a 41 y.o. woman were struck while crossing in the crosswalk, at 10:45 PM. The two victims were part of a five pedestrian group (some or all intoxicated) who crossed this intersection against a "DON'T WALK" signal. The victims were walking south on the east side of the intersection of E. 31st Street and Nicollet Avenue. The victims may have been walking to a bar that has since ceased operation.

Broadway Avenue

14. (September) A 50 y.o. woman was struck by a vehicle, while crossing the roadway, at 1:10 AM. She was crossing north on W. Broadway Avenue at a point 200 feet east of 2nd Street when she was struck. She was not crossing in a crosswalk. There were taverns in operation on three of the four corners at the Broadway Avenue and 2nd Street intersection.
15. (March) A 45 y.o. man was struck by a car while in a crosswalk at 12:05 AM. At this wide, 4-lane intersection:

a. The "WALK" sign remains lit for 4.5 seconds,

b. The flashing "DON'T WALK" sign then remains lit for 9.0 seconds,

c. A person leaving the curb at a leisurely pace when the "WALK" sign initially lights up would barely make it to the other side of the intersection before the solid "DON'T WALK" sign is lit,

d. A person leaving the curb at a leisurely pace when the "WALK" sign is getting ready to change to a flashing "DON'T WALK" sign would not make it across the intersection before cross traffic began flowing, and
e. The crosswalk at the northwest corner of this intersection terminates directly on the corner of the roadway.

Interstate Highways

16. (June) A 7 y.o. boy was struck by a vehicle while crossing a divided highway, at 6:30 PM. The boy was crossing the exit ramp from eastbound I-94 to Hiawatha Avenue South (Route 55). This exit ramp was separated from a bordering residential district by a 4.5 foot tall climbable chain link fence.
17. (July) A 27 y.o. man was struck by a vehicle, while standing on or crossing a divided highway, at 10:00 PM. The man was struck on westbound I-94 at Hennepin Avenue. A vehicle struck the victim and pushed the body into the Lowry Tunnel. This section of highway was separated from a bordering residential district by a 4.5 foot tall climbable chain link fence.
18. (January) A 27 y.o. man was struck sequentially by four vehicles, while crossing a divided highway, at 11:09 PM. The man was crossing eastbound I-94 at the Nicollet Avenue overpass. This section of highway was separated from a bordering residential district by a 4.5 foot tall climbable chain link fence.
19. (August) A 28 y.o. man was struck by a vehicle, while crossing a divided highway, at 6:05 PM. The man was crossing southbound I-35 W at the Hiawatha Avenue South (Route 55) exit. This section of highway was separated from a bordering residential/business district by a 4.5 foot tall climbable chain link fence.

IV. DISCUSSION

A. Characterization

This study's characterization of NAPF's indicates some similarities and some striking differences between NAPF's and general pedestrian injury statistics in the United States.1 The overrepresentation of males, the day of the week (Saturday) when most pedestrian fatalities occurred, and the time of day (6:00 PM to 6:00 AM) when most of these fatalities occurred coincide with national data. However, national data indicate a peaking of pedestrian deaths in December while this study indicated an apparent peak in May. This phenomenon can possibly be explained by considering exposure. Native Americans oftentimes do not have their own means of transportation. They are forced to seek transportation by hitchhiking or perhaps walking. This is a function of socio-economics that Rivara and Barber (1985) cited as being strongly correlated with exposure to pedestrian injury.5 Improved weather conditions in the spring and summer lead to an increase in both hitchhiking and walking. This study indicated that the leading type of pedestrian action (among incidents where this information was known) leading to NAPF's was simply walking along the roadway. This study also indicates that there are distinct differences in NAPF's that occur in urban situations as opposed to rural situations.

B. Clustered NAPF's

1. Intervention Alternatives: There are several suggested approaches to reducing pedestrian fatalities. Some people promote "training" (behavior modification).(6,7) However, many others recommend modification of environmental factors.(5,8-10) Even among researchers who support the educational approach, there is a disagreement as to how behavior should be modified. For example, there is disagreement as to whether street crossing skills should be taught or whether training should be provided to teach people to avoid street crossing as much as possible.(8)

The City of Minneapolis in 1981 implemented an "Accident Reduction Project" or TACT (Top Accident Control Targets). This program concentrated the resources of city agencies on those segments of roadway where "accident" levels were unusually high. This program is a complex, computerized system of determining high risk roadway segments and attempting to monitor and modify driver behavior in these areas. Although environmental modification is a component of the program goals, driver behavior modification, by such tactics as public service announcements and increased law enforcement, is considered the top goal. The program claims "accident" reduction rates up to 50%.(11) One must wonder what the effects of such a major program would be if primary consideration were given to environmental modification.

There is a belief that wearing bright colors or reflective materials will reduce pedestrian fatalities.(2,12) However, even if the pedestrian is perceived by a motorist, a driver's behavior is modified only minimally unless a large group of pedestrians is present. There is also the challenge of how to persuade the public, especially those at highest risk, to wear conspicuous clothing.(13)

2. Recommended Interventions

The following is a listing of environmental intervention strategies for the clustered NAPF's. These strategies are recommended based on known, potentially contributing hazards identified at each fatality site.

Red Lake Reservation, MN

*Cases 3, 4, and 5 - Due to frequent pedestrian traffic and several resultant pedestrian fatalities, it is recommended that an all-weather walkway be constructed on the south side of S. R. 89/1. This walkway would originate at a point approximately four (4) miles west of the S. R. 89 S junction and extend into "Red Lake Village." It would be essential that provisions for keeping this walkway clear during winter months be enacted.

Menominee Reservation, WI

*Cases 7 and 8 - Due to frequent pedestrian traffic and several resultant pedestrian fatalities, it is recommended that the existing sidewalk be extended an additional 4/10 miles to a point terminating at the furthest tavern. It would be essential that provisions for keeping this walkway clear during winter months be enacted.

Minneapolis, MN

Franklin Avenue

*Case 9 - In an effort to increase motorist visibility, it is recommended that the identified bus stop be relocated to a point further south on Park Avenue.

* Case 10 – The liquor store should be required to close before dusk. Reflective stickers could be placed on liquor bags originating from this store. It is also recommended that liquor store owners be held in greater responsibility for loiterers outside of their places of business.

* Cases 11 and 12 - Due to the nature and location of the section of roadway, and the numbers of jaywalkers, median barriers should be constructed on E. Franklin Avenue near the Minneapolis Native American Center.

Broadway Avenue

*Case 14 - It is recommended that the burden of responsibility for tavern owners to refuse to serve visibly intoxicated customers be increased.

*Case 15 - Due to the several identified crosswalk problems, it is recommended that traffic lights be reprogrammed to allow adequate time for pedestrians to cross this intersection. Also, the crosswalks for this intersection need to be redesigned so that the northwest corner of these crosswalks does not terminate in the roadway.

Interstate Highways

*Cases 16, 17, 18, and 19 - Due to the perceived pedestrian traffic on the interstate highways near several residential areas, it is recommended that this problem be further investigated by researching city and state data for high risk areas and replacing fencing in these areas with a taller, non-climbable variety.

C. Intended Use of this Study

It is hoped that the information that relates to the clustered NAPF's be used in an effort to specifically reduce the pedestrian fatality problems at each of these locations. Also, this study can serve as a "guideline" to aid IHS personnel in other geographic areas to identify and reduce pedestrian fatality problems.

References:

1. Baker SP, O'Neill B, Karpf RS: The Injury Fact Book. Lexington, MA, Lexington Books, 1984.
2. Mueller, BA, Rivara FP, Bergman AB: Factors associated with pedestrian-vehicle collision injuries and fatalities. West J Med 1987 Feb; 146:243-245.
3. Shepherd CA: Pedestrian injury control program proposal for the Navajo Reservation. Unpublished.
4. Lotus Development Corporation: Lotus 1-2-3 Release 2. Cambridge, MA, 1985.
5. Rivara FP, Barber M: Demographic analysis of childhood pedestrian injuries. Pediatrics 1985;76:375-381
6. Koelmeyer, TD, et al: Childhood pedestrian deaths. NZ Med J 1986;99:541-543.
7. Thompson SJ, Fraser EJ, Howarth CI: Driver behavior in the presence of child and adult pedestrians. Ergonomics 1985;28,10:1469-1474.
8. Guyer B, et al: Pedestrian injuries to children and youth. Pediatric Clinics of North America 1985;32:163-174.
9. Robertson LS: Injuries: Causes, Control Strategies, and Public Policy. Lexington, MA, Lexington Books, 1983.
10 .Injury in America: A Continuing Public Health Problem. Washington, D. C., National Academy Press, 1985.
11. City of Minneapolis, Department of Public Works: Top Accident Control Targets (TACT): The Accident Reduction Project. Unpublished, 1987.
12. Blomberg RD, Hale A. Preusser DF: Experimental evaluation of alternative conspicuity enhancement techniques for pedestrians and bicyclists. Journal of Safety Research 1986;17:1-12.
13. Reinhardt-Rutland AH: Note on nonveridical visual perception and pedestrian accidents at night. Perceptual and Motor Skills 1986;63:371-374.